To : Del Jenstrom (NASA/GSFC)
From : John Taylor, Edward Wack (MIT/Lincoln Laboratory)
Subject: Frequency Allocation Concepts for Future GOES Communications
Date : November, 2000

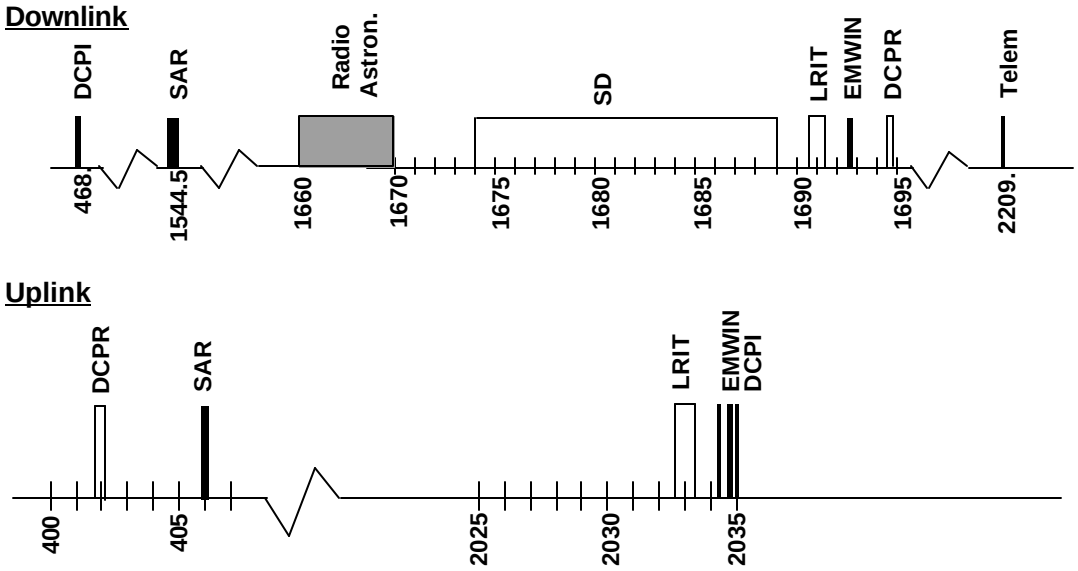
Listed below are possible implementations, in terms of frequency assignments and modulation, of three of the communication options listed in the Preliminary Systems Requirements document.

Discussion:

Option 1a corresponds to a Sensor Data (SD) rate of 24 Mbps and a Processed Data Relay (PDR) rate of 0 Mbps, as detailed in Appendix A, Preliminary System Requirements. One potential implementation of this option is shown below. The service frequency assignments are all maintained. The SD link is implemented using QPSK modulation and occupies 15 MHz of the available 16 MHz bandwidth.

Option 1a. Sensor Data Only

Service	Data Rate in Mbps	Modulation Type	BW Used (MHz)	
Sensor Data only	**24.0**	**QPSK (1.6 bits/Hz)**	**15.0 (16 available)**	

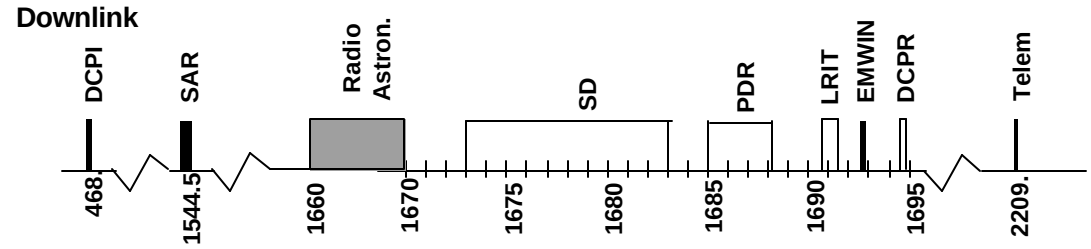


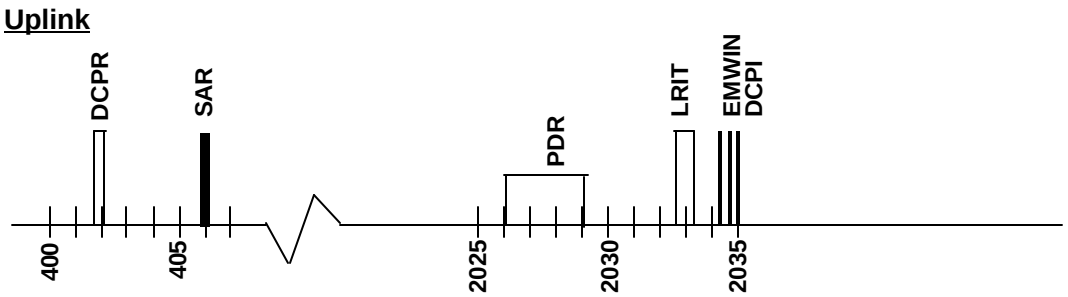
Discussion:

Option 1b corresponds to a Sensor Data (SD) rate of 24 Mbps and a Processed Data Relay (PDR) rate of 5 Mbps, as detailed in Appendix A, Preliminary System Requirements. One potential implementation of this option is shown below. The service frequency assignments are all maintained. The SD link is implemented using 8PSK modulation and occupies 10 MHz of the available 16 MHz bandwidth. The PDR link is implemented using QPSK modulation and occupies 3.1 MHz of bandwidth. Neither channel is shown with any coding.

Option 1b. SD & PDR Data

Service	Data Rate in Mbps	Modulation Type	BW in MHz	
SD	24.0	8PSK (2.4 bits/Hz)	10.0	
PDR	5.0	QPSK (1.6 bits/Hz)	3.1	





Discussion:

Option 2a corresponds to a Sensor Data (SD) rate of 37 Mbps and a Processed Data Relay (PDR) rate of 0 Mbps, as detailed in Appendix A, Preliminary System Requirements. One potential implementation of this option is shown below. The service frequency assignments are all maintained. The SD link is implemented using 8PSK modulation and occupies 15.4 MHz of the available 16 MHz bandwidth.

Option 2a. Sensor Data Only

Service	Data Rate in Mbps	Modulation Type	BW Used (MHz)	
Sensor Data only	**37.0**	**8PSK (2.4 bits/Hz)**	**15.4 (16 available)**